

**MIDTERM 1** (Total Points: 100)

**(I) Basic Solow Model with population growth (without technological change)**

(The relevant equations are given in the attached handout)

(1) (6 pts) Write down the equations of for :

- output per worker as a function of the capital per worker
- change of capital per worker as a function of capital per worker.

(2) (10) What are the conditions that need to be satisfied along a balanced growth path (BGP) for the original system (or the steady state of the modified system in per worker variables)?

Draw a diagram to identify the level of capital per worker along a BGP.

(3) (6 pts) What are the growth rates of **output per worker** and **total output** at the BGP?

(4) (6) Suppose country A and country B are identical in every aspect except that country A has a higher savings rate than country B. Can you tell whether consumption per worker along the BGP will be higher in country A than in country B? Justify (no need to draw a diagram)

(5) Suppose a country is at the BGP and it suddenly receives a large number of immigrants (notice that the rate of population growth does not change). Answer the following questions with a diagram when possible:

( i ) (6 pts) What happens to the level of capital per worker in the periods immediately following the arrival of the immigrants? Justify.

( ii ) (4 pts) Is output per worker growing or shrinking in the periods immediately following the arrival? Justify.

( iii ) (3 pts) What happens to the level of output per worker at the BGP? Justify.

( iv ) (3 pts) What happens to the growth rate of capital per worker at the BGP? Justify.

(6) Suppose a country is at the BGP and in period 100 the **rate of population growth** decreases (notice that the rate stays at the new level for ever). Answer the following questions with the help of a **diagram when possible**.

( i ) (6 pts) What happens to the level of capital per worker in periods 100, 101, 102? Justify.

( ii ) (4 pts) What happens to the growth rate capital per worker in periods 100, 101, 102? Justify.

( iii ) (2 pts) What happens to the level of output per worker at the BGP? Justify.

( iv ) (2 pts) What happens to the growth rate of capital per worker at the BGP? Justify.

**(II) (6 pts) Solow Model With labor Augmenting Technological Change/ Solow Basic**

## Model without technological change

Briefly compare the growth rates of output per worker at the BGP in both models (assume there is **no population growth**).

### (III) High Performing East Asian Economies / Growth Accounting

The table below present estimates of the growth of output, capital and labor during roughly 5 years for Hong Kong and Singapore (i.e. it presents the growth rates of  $Y$ ,  $K$  and  $L$  for the entire specified period). We also know that the capital shares are 0.53 for Singapore and 0.38 for Hong Kong (i.e.,  $\alpha_s = 0.53$  and  $\alpha_{HK} = 0.38$ ):

Country/ Time Period	Estimates of Growth of		
	Output	Labor	Capital
Singapore 80-85	0.300	0.249	0.474
Hong Kong 81-86	0.294	0.108	0.374

(1) (12 pts) Calculate total factor productivity growth for both countries for the specified periods.

(2) (10 pts) Suppose a World Bank official tells you that she calculated the change in technical efficiency for both countries during this period and that she found that both countries were catching up. Assuming that the best technology available worldwide improved 8 % during this period ( i.e.  $\hat{A}^* = 0.08$  in the notation used in class ): do you think that her conclusion is correct? Justify.

### (IV) Short Questions

(1) (6 pts) Briefly identify:

- the main issues faced by the financial/banking system in E. Asia shortly before and during the crisis.
- what has happened to “nonperforming loans” since then.

(2) (6 pts) Identify the main characteristics (at least three) of the world economy during the late 1800's and early 1900's.